How Arizonans Can Help Achieve the Goals

of the

Environmental Portfolio Standard

Proposal for a Uniform EPS Credit Purchase Program

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How Arizonans Can Help Achieve the Goals of the Environmental Portfolio Standard

Proposal for a Uniform EPS Credit Purchase Program

The Environmental Portfolio Standard (EPS), enacted by the Arizona Corporation Commission in 2001, includes provisions that allow a Load-Serving Entity (LSE) to count renewable forms of Distributed Generation (DG) toward their portfolio requirements. DG, from an industry perspective, includes wind, fuel cells, internal combustion engine/generators, micro-turbines, solar thermal, photovoltaics and other small-scale generation technologies. These technologies are often classified as "Distributed" because they typically provide electric power, or generate energy, on a customer's premises or at a site closer to a customer than a central station generator. Of the various DG technologies, only wind, solar hot water and photovoltaics are included as qualifying technologies in the EPS. As of November, 2003, only solar hot water and photovoltaic distributed systems have been included by the LSEs toward their EPS requirements.

Arizona's EPS – Background Information

The following items are contained in the report prepared by the Cost Evaluation Working Group and submitted to the ACC on June 30, 2003:

1. Both APS and TEP, the largest LSEs affected by the EPS rule, were unable to meet their EPS solar-electric generation requirements after all banked credits were exhausted. Without additional funds, this situation is not predicted to change for APS. It is estimated that TEP will be in compliance with their solar-electric requirements by the year 2012, but only if their investment in Global Solar's photovoltaic manufacturing facility in Tucson realizes a significant increase in output capacity in the near term. (reference "II. Status of Environmental Portfolio Standard Implementation", "TEP Approach", pg. 14)
2. Distributed PV Systems (customer-sited, customer-owned) resulted in the lowest cost method of generating solar-electric credits using EPS funds (reference Table III-1, pg. 20). The next lowest cost for generating solar-electric credits comes from large grid-tied, non-tracking PV systems – but the average cost for an EPS credit from this option is over 2-½ times the cost for an EPS credit from a customer-sited, customer-owned system.
3. For every dollar of EPS funds spent on distributed PV systems (customer-sited, customer-owned), another four to five dollars of outside funding is leveraged and applied to the EPS program (Table III-1, pg. 20). This rate of leveraging outside funding does not occur on projects owned and operated by the utility companies (reference Appendix 1, Table A1-1 under "Revenues - Corporate Investment" and Table A1-2 does not include any measure of corporate investment).
4. For every 100 kW of customer-sited, customer-owned PV systems, approximately 8.75 person years of employment are realized. For every 100 kW of large utility-owned and operated PV systems, approximately 4.85 person years of employment are realized (reference Impacts Section of CEWG Report).

The primary participants in the EPS; Arizona Public Service Co., Tucson Electric Power Co., and the Navopache Electric Co-op, have all implemented customer-sited photovoltaic projects and/or programs to help meet their EPS requirements. Additionally, Arizona Public Service has initiated a solar thermal program for residential systems and purchased EPS credits from larger commercial-scale solar thermal projects. There are two categories of projects that have occurred:

- Utility-owned, customer-sited
- Customer-owned, customer-sited.

Projects that are utility-owned and customer-sited use the customer's property to host the utility's photovoltaic power system or solar thermal system. Power ratings for these systems range from

a few kilowatts to hundreds of kilowatts. Systems owned and operated by the customer can qualify for the EPS and are typically addressed by EPS Credit Purchase Programs offered by the LSE.

EPS Credit Purchase Programs

Over the past three years, both APS and TEP have developed and implemented programs that procure EPS credits from customers who install their own systems (customer-owned, customer-sited). Prior to 2004, these programs were very limited in scope and the majority of the systems installed were solar electric power systems 5 kW or less is size. The EPS Credit Purchase Payment amounts and program guidelines vary greatly between the two companies.

The current EPS Credit Purchase Programs offered by Arizona Public Service include offers for solar hot water and photovoltaic EPS credits. APS recently modified both of its EPS Credit Purchase Programs. Prior to 2004, all photovoltaic systems (both on- and off-grid) in APS service territory qualified for a $2 per Watt-DC incentive, with the maximum incentive capped at $10,000 per system (or 5 kW-DC). The Solar Hot Water EPS CPP incentive amount prior to 2004 was $350 per system.

Revisions to the APS program include the following (effective Jan. 1st, 2004):

- Total funding for 2004 capped at $1,250,000
- $250,000 dedicated to Solar Hot Water EPS CPP
- Solar Hot Water incentive amount raised to $750 per qualifying system
- $1,000,000 dedicated to Photovoltaic EPS CPP
- 50% of Photovoltaic EPS CPP funds dedicated to systems greater than 5 kW-DC; 50% of funds dedicated to systems under 5 kW-DC
- Photovoltaic incentive equals $2 per Watt-DC for off-grid systems; increased to $4 per Watt-DC or 50% of the installed system price (whichever is less) for grid-connected systems
- Instituted reservation process for EPS CPP funds.
- Quote from retailer and installer must be included with reservation application.
- Set limit on reservation period for 180 days – project must be completed 180 days from date of reservation confirmation
- Increased maximum system size for PV – size is capped by available funds

The APS EPS Credit Purchase Program revisions are welcomed by the solar industry and represent an aggressive move by APS to secure customer-generated EPS credits. Even though the revised program has been underway for less than a month, significant increases in system installations are being realized. APS has also taken a “hands-off” approach to their customers wishing to participate in their program, leaving design and installation guidelines up to the customer and their equipment installer/provider.

TEP also offers an EPS Credit Purchase Program to it’s customers under the “SunShare” program name. This program is substantially different from the APS EPS Credit Purchase Program and only supports customers who install photovoltaic power systems on their property. Currently, there are two options offered by TEP under SunShare. The first option offers the customer a direct hardware buy-down of $2 per Watt-AC for qualifying systems that the customer has installed on their property.

The second TEP option is the purchase of a system directly from TEP. The system included in this option is designed and procured in advance by TEP. The equipment is subsidized by EPS funds and offered to the customer at a discounted price. Both TEP SunShare options require that interested customers contact TEP prior to installing a system. Customers are then assigned a

TEP representative who will visit the property and determine whether or not the customer's location is adequate for installing a system. Additional constraints on the SunShare program include a system size limit of 5 kW-AC, numerous design criteria and a strict system testing procedure for systems not supplied by TEP (performed by TEP personnel).

Planning for the Future

Even with improvements in the APS EPS Credit Purchase Program, there are still many items that need to be addressed in order for customer-oriented programs to succeed in Arizona. The industry believes that any customer-oriented program in Arizona should have two goals: first, to develop a low-cost method for LSEs to meet a portion of their EPS requirements, and second, to aid in the development of a sustainable market for customer-owned, customer-sited renewable energy systems. The first part of this goal has been met. EPS credits from customer-owned renewable energy systems are the lowest cost method for LSEs to meet their EPS requirements. By leveraging the capital of a system owner with EPS funds, the LSE avoids the additional costs incurred when installing a system at their sole expense. In addition to EPS credits, the LSE can also obtain the rights to other valuable system attributes through this process (i.e., emissions reduction credits).

Achieving the second goal requires foresight. It requires planning. It requires certainty. The remainder of this paper focuses on a proposal for a uniform EPS Credit Purchase Program. It is our opinion, as a major stakeholder in the EPS Credit Purchase Programs, that uniformity and market certainty, will achieve the second goal over the remaining life of the EPS.

The Opportunity

Funding has been a major issue associated with the EPS since its inception. By implementing an aggressive, uniform EPS Credit Purchase Program, a significant boost to EPS funding levels can be realized. For example, an EPS Credit Purchase Program that is allocated 30% of the EPS Surcharge and Systems Benefits Charge funds collected by APS, TEP and USES, would result in the leveraging of over $97 million in non-EPS funds between the years 2005 and 2012 (see Table 1 below).

If the ACC supports and implements an aggressive, uniform EPS Credit Purchase Program, many benefits will be realized. These include:

- Higher level of compliance with the EPS generation requirements for all LSEs
- Additional funds applied to the EPS program without the need for additional surcharges or modification to the existing rule
- More solar capacity installed in Arizona when compared to the long-term EPS implementation plans of the LSEs
- More Arizona jobs – in solar and other related industries

If these results are attained, then the goals of the Arizona Environmental Portfolio Standard would be met to a greater degree (see "Goals of the Environmental Portfolio Standard", Pg. 7-8, CEWG Report).

Proposed Program Guidelines

There are a number of critical elements required to implement a successful EPS Credit Purchase Program. Many of these elements have been identified through the experiences of stakeholders participating in the development and successful operation of similar "incentive" programs throughout the country (reference Appendix B, "On the Path to Mainstream Solar Power: Top 10

Recommendations to Enable Success"). However, there are certain factors specific to Arizona that must be addressed. These are:

- Funding for both LSE-owned and customer-owned systems
- EPS Credit Purchase Programs for all qualifying customer-sited, customer-owned technologies
- Impacts on the overall goal – meeting the EPS percentage requirements

In order to address these issues, we propose the following general guidelines for a Uniform EPS Credit Purchase Program be established and enacted by January 1st, 2005:

1. 30% of EPS Surcharges and Systems Benefits Charges collected by the LSEs be allocated to the Uniform EPS Credit Purchase Program. The remaining 70% of funds to be allocated to the LSEs for their internal EPS programs.
2. From the funds dedicated to the Uniform EPS CPP, 1% to be designated for program administration and 2% to be applied to an ACC and stakeholder approved customer awareness and education program. The customer awareness and education funds would decrease at a rate of 5% per year. Annual review of the awareness and education program would be performed by all stakeholders.
3. Divide the remaining funds between photovoltaic and solar hot water EPS Credit Purchase Programs: 75% to photovoltaic programs, 25% to solar hot water programs.
4. Apply uniform incentives to all EPS Credit Purchase Programs
    a. $3.10 / Watt-DC or 50% of the system cost (whichever is less) for all photovoltaic systems
    b. $1 / Watt (equivalent) or 50% of the system cost (whichever is less) for all solar hot water systems
5. Steadily decrease the incentive amount for each CPP
    a. For photovoltaic systems, $0.30 / Watt-DC per year
    b. For solar hot water systems, 2% per year

The application of this program will have profound effects on the EPS by immediately infusing consumer funds with those dedicated to the program by the LSEs. The following table provides a glimpse at a portion of the results during the proposed tenure of this program:

Table 1. EPS Credit Purchase Program Totals (2005 - 2012) *

Total Capital Leveraged	$97,996,816
Total EPS Funds Allocated to CPP	$46,725,373
Total Funds Attributed toCPP	$144,722,189

Market Segment Totals (2005 - 2012) *

Photovoltaics (PV)	
Total MW-DC Installed	26.5
Total EPS funds allocated to PV CPP	$35,044,030
Total Capital Leveraged by PV CPP	$86,315,473
Total Jobs in 2012 created by PV CPP	549
Solar Hot Water (SHW)	
Total SHW Systems Installed	8,386
Total EPS funds allocated to SHW CPP	$11,681,343
Total Capital Leveraged by SHW CPP	$11,681,343

* For APS, TEP and USES only. See Appendix A for details.

In addition to the enormous leveraging opportunity the uniform EPS CCP provides there is also a significant impact on each LSE's EPS generation requirements. A large portion of both the 'Solar-electric' and 'Other Renewables' component of the EPS will be met by customer-owned, customer-sited systems. The following table provides our predictions on the percentage of each EPS segment that will be met for the LSEs identified:

Load Serving Entity	% of 'Solar Electric' Requirement Met by EPS CPP in 2012	% of 'Other Renewables' Requirement Met by EPS CPP in 2012
Arizona Public Service Co.	39.6%	24.8%
Tucson Electric Power Co.	40.8%	25.6%
UniSource Energy Services	40.8%	25.6%

Conclusions

In order to develop an EPS Credit Purchase Program that is uniform and acceptable to all stakeholders, including the ACC, the solar industry, the LSEs and the ratepayers, we recommend that a stakeholder working group be established. We also recommend that this working group schedule a series of meetings during the next six months. During these meetings, the focus should be on developing the guidelines for a fair and uniform EPS Credit Purchase Program that can be adopted by the ACC and provided to the LSEs by October 1st, 2004 for implementation on January 1st, 2005.

Appendix A: ***Proposed EPS CPP – Impact on Arizona Public Service Co.***

Effects of Proposed EPS Credit Purchase Program (CPP) 2005 to 2012

LSE: Arizona Public Service Co.

Results:

Total Funds Allocated to EPS (SBC and EPS Surcharge Estimates for 2005-2012):	$114,509,741
Solar Electric CPP	
Portion of "Solar Electric" Requirement met by EPS CPP in YR 2012:	39.6%
Total "Solar Electric" MWp Installed (2005-2012):	19.0
Total Capital Leveraged - Solar Electric Installations:	$61,784,834
Total EPS Funds Committed to Solar Electric CPP:	$25,084,605
Percentage of Total EPS Funds used by Solar Electric CPP:	21.9%
Jobs Created (direct & indirect) by 2012:	393
Solar Hot Water CPP	
Portion of "Other Renewables" Requirement met by EPS CPP in YR 2012:	24.8%
Total Capital Leveraged - Solar Hot Water Installations:	$8,361,535
Total Number of Systems Installed - Solar Hot Water:	6,002
Total EPS Funds Committed to Solar Hot Water CPP:	$8,361,535
Percentage of Total EPS Funds used by Solar Hot Water CPP:	7.3%
Total Capital Leveraged (PV & SHW):	$70,146,369

Variables:

Percent Increase in EPS Funds Collected per Year:	2.00%
Percentage of Total Funds Allocated to EPS Credit Purchase Program:	30.0%
Solar Electric CPP	
Initial Solar Electric Incentive Amount (per Wp):	$3.10
Annual Reduction in Solar Electric Incentive Amount (per Wp):	$0.30
Average Solar Electric System - Installed Price ($/Wp) for 2005:	$6.00
Percentage of Incentive Funds Allocated to Solar Electric:	75.0%
Estimated Decrease in Installed System Price (per year):	4.0%
Solar Hot Water CPP	
Initial Solar Hot Water Incentive Amount per system:	$1,500.00
Annual Reduction in Solar Hot Water Incentive Amount:	2.0%
Average Solar Hot Water System - Installed Price for 2005:	$3,000.00
Estimated Decrease in Installed System Price (per year):	2.0%
Percentage of Incentive Funds Allocated to SHW:	25.0%
Kilowatt-hours per Solar Hot Water System (annual average - provided by AriSEIA)	2500
Other CPP Variables	
Consumer Education Program - Percent of EPS CPP Allocated (2005):	2.0%
Annual Decrease in Funding for Consumer Education Program:	5.0%
Other EPS Variables	
EPS Solar Electric Requirement (percentage of total requirement)	60.0%
Kilowatt-hours generated by 1 kWp of Installed PV capacity per year	1890
EPS Multiplier for CPP Systems (0.5 for customer sited + 0.5 for in-state + 0.075 for in-state content)	1.075
Jobs / 1,000 kWp Installed (Table V-2, CEWG Report, Page 43)	87.5
EPS "Other Renewables" Requirement (percentage of total requirement)	40.0%

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **Arizona Public Service Co.**

Distribution of Funds - LSE Projects & EPS CPP

Year	Total Funds Collected for EPS Programs *	% of Total Funds Allocated to LSE's EPS Projects	Funds Allocated to LSE's EPS Projects	% of Total Funds Allocated to EPS CPP	Funds Allocated to EPS CPP
2002	$12,572,000				
2003	$12,823,440				
2004	$13,079,909				
2005	$13,341,507	70%	$9,339,054.88	30%	$4,002,452
2006	$13,608,337	70%	$9,525,835.98	30%	$4,082,501
2007	$13,880,504	70%	$9,716,352.70	30%	$4,164,151
2008	$14,158,114	70%	$9,910,679.75	30%	$4,247,434
2009	$14,441,276	70%	$10,108,893.35	30%	$4,332,383
2010	$14,730,102	70%	$10,311,071.22	30%	$4,419,031
2011	$15,024,704	70%	$10,517,292.64	30%	$4,507,411
2012	$15,325,198	70%	$10,727,638.49	30%	$4,597,559
Total:	**$114,509,741**		**$80,156,819**		**$34,352,922**

Year	EPS CPP - Administration (1%)	EPS CPP - Consumer Education	EPS CPP - Funds Available for Incentives	EPS CPP - Funds for Solar Hot Water Incentives	EPS CPP - Funds for Solar Electric Incentives
2005	$40,025	$80,049	$3,882,379	$970,595	$2,911,784
2006	$40,825	$77,568	$3,964,109	$991,027	$2,973,081
2007	$41,642	$74,955	$4,047,555	$1,011,889	$3,035,666
2008	$42,474	$72,206	$4,132,753	$1,033,188	$3,099,565
2009	$43,324	$69,318	$4,219,741	$1,054,935	$3,164,806
2010	$44,190	$66,285	$4,308,555	$1,077,139	$3,231,416
2011	$45,074	$63,104	$4,399,233	$1,099,808	$3,299,425
2012	$45,976	$59,768	$4,491,815	$1,122,954	$3,368,862
Total:	**$343,529**	**$563,253**	**$33,446,140**	**$8,361,535**	**$25,084,605**

* Baseline is 2002 (from Table A1-2, CEWG Report) and includes SBC and EPS Surcharge funds only; 2003 to 2012 are estimates and assume annual increase of 2% due to expansion of customer base.

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **Arizona Public Service Co.**

Solar Electric Component of EPS CPP

Year	Solar Electric Incentive Amount ($/Wp)	Minimum Wp Funded	Average System Cost ($/Wp) **	Capital Leveraged	Cumm. Solar Electric Power Installed (Wp)	Solar Electric kWh Generated
2005	$3.10	1,252,380	$6.00	$3,631,902	1,252,380	2,366,999
2006	$2.80	1,415,753	$5.76	$4,190,629	2,668,133	5,042,772
2007	$2.50	1,619,022	$5.53	$4,904,989	4,287,155	8,102,723
2008	$2.20	1,878,524	$5.31	$5,839,235	6,165,680	11,653,134
2009	$1.90	2,220,916	$5.10	$7,098,225	8,386,596	15,850,666
2010	$1.60	2,692,847	$4.89	$8,865,487	11,079,443	20,940,146
2011	$1.30	3,384,026	$4.70	$11,494,001	14,463,468	27,335,955
2012	$1.00	4,491,815	$4.51	$15,760,365	18,955,284	35,825,486
Total:		**18,955,284**		**$61,784,834**		**127,117,881**
	MWp =	19.0			MWh =	127,118

Year	Solar Electric EPS Credits Generated	APS Retail kWh ***	EPS %	"Solar Electric" Requirement (kWh)	Percentage of EPS Solar Electric Requirement Met by CPP	In-State Jobs (by year)
2002		23,361,755,000	0.40			
2003		23,828,990,100	0.60			
2004		24,305,569,902	0.80			
2005	4,911,522	24,791,681,300	1.00	148,750,088	3%	110
2006	10,463,752	25,287,514,926	1.05	159,311,344	7%	124
2007	16,813,151	25,793,265,225	1.10	170,235,550	10%	142
2008	24,180,254	26,309,130,529	1.10	173,640,261	14%	164
2009	32,890,132	26,835,313,140	1.10	177,113,067	19%	194
2010	43,450,804	27,372,019,402	1.10	180,655,328	24%	236
2011	56,722,106	27,919,459,790	1.10	184,268,435	31%	296
2012	74,337,883	28,477,848,986	1.10	187,953,803	40%	393

** System price for 2005 based on information provided by American Solar Electric for average grid-tied system price (non-battery); Price estimated to decline 4% per year after 2005

*** From Table II-2, Pg. 13, CEWG Report; 2003 to 2012 are estimates and assume annual increase of 2% due to expansion of customer base

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

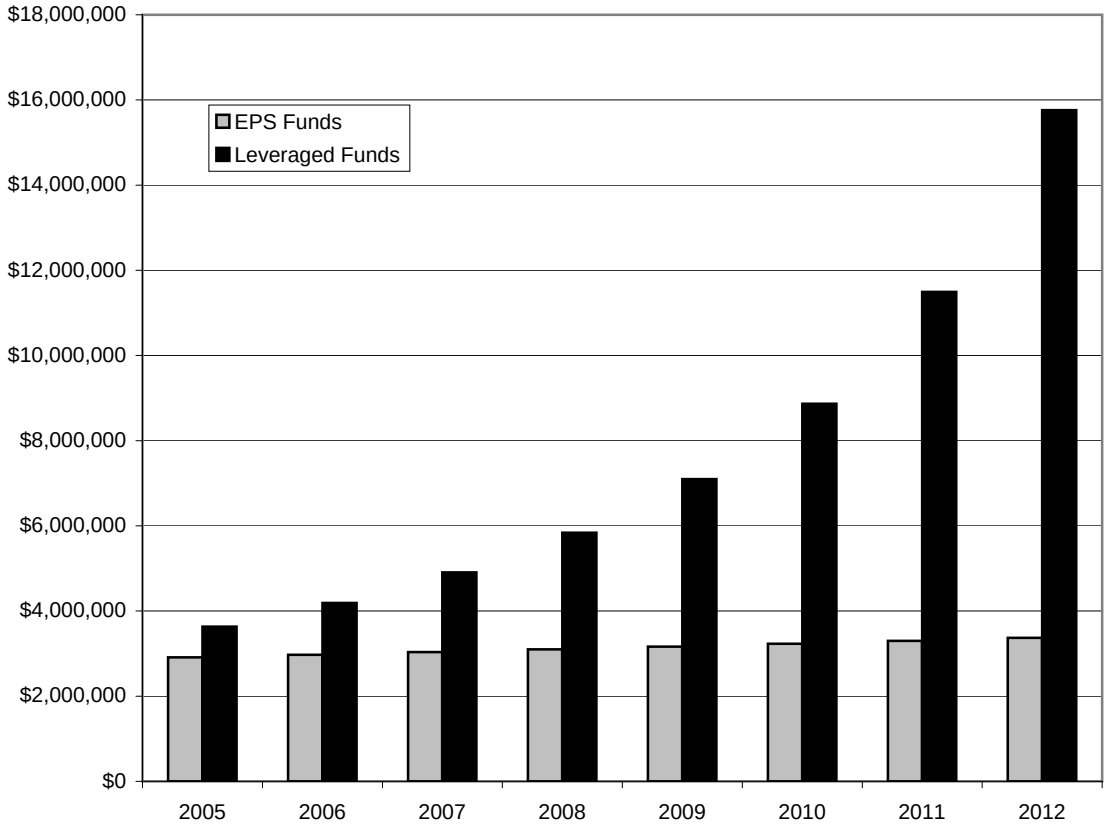
LSE: **Arizona Public Service Co.**

Solar Hot Water Component of EPS CPP

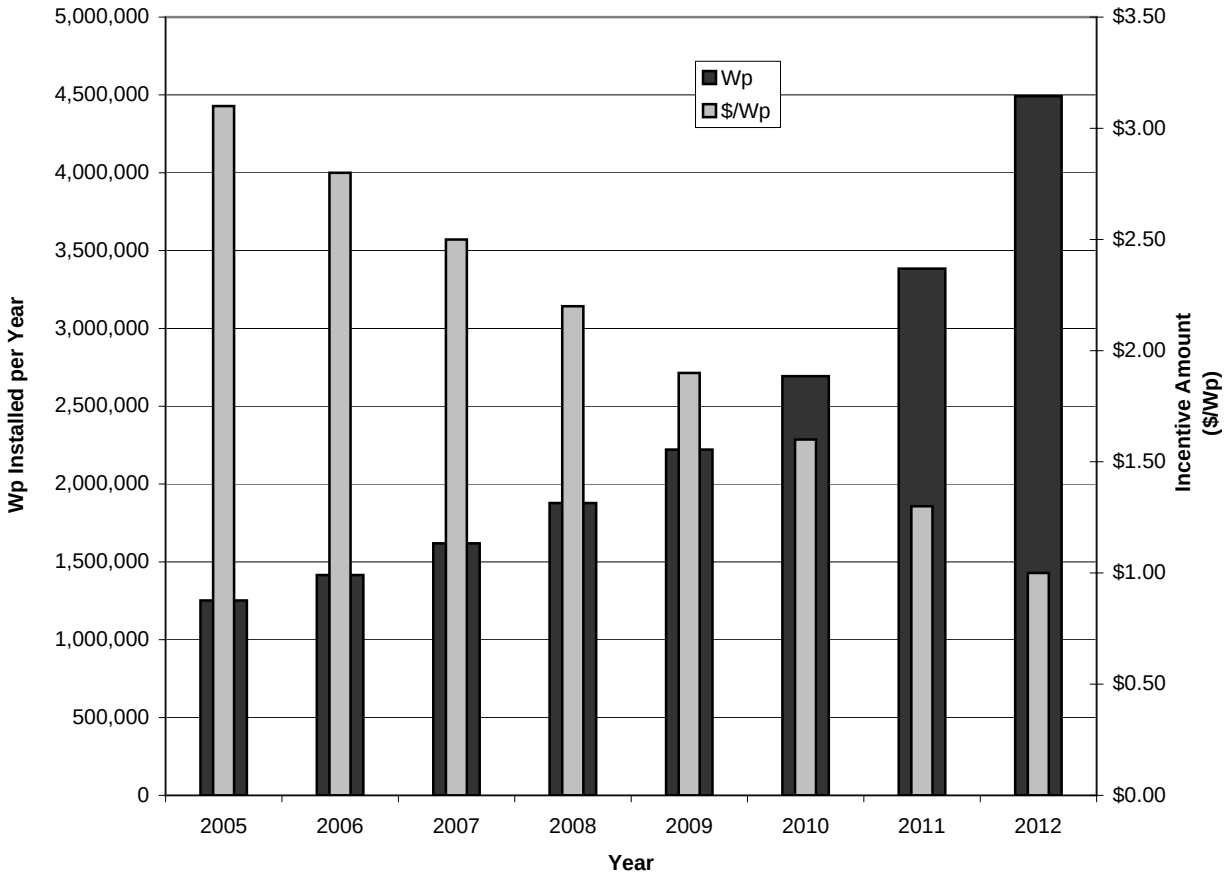
Year	Solar Hot Water Incentive Amount ($/System)	Minimum No. of Systems Funded	Avg. System Cost ($/System)	Capital Leveraged	Cumm. Number of Solar Hot Water Systems	Solar Hot Water kWh Generated (equivalent)
2005	$1,500.00	647	$3,000.00	$970,595	647	1,617,658
2006	$1,470.00	674	$2,940.00	$991,027	1,321	3,303,078
2007	$1,440.60	702	$2,881.20	$1,011,889	2,024	5,059,098
2008	$1,411.79	732	$2,823.58	$1,033,188	2,755	6,888,672
2009	$1,383.55	762	$2,767.10	$1,054,935	3,518	8,794,880
2010	$1,355.88	794	$2,711.76	$1,077,139	4,312	10,780,929
2011	$1,328.76	828	$2,657.53	$1,099,808	5,140	12,850,161
2012	$1,302.19	862	$2,604.38	$1,122,954	6,002	15,006,059
Total:		**6,002**		**$8,361,535**		**64,300,534**
					MWh =	64,301

Year	Solar Hot Water EPS Credits Generated	APS Retail kWh ***	EPS %	"Other Renewables" Requirement (kWh)	Percentage of EPS "Other Renewables" Requirement Met by CPP
2002		23,361,755,000	0.40		
2003		23,828,990,100	0.60		
2004		24,305,569,902	0.80		
2005	3,356,640	24,791,681,300	1.00	99,166,725	3%
2006	6,853,887	25,287,514,926	1.05	106,207,563	6%
2007	10,497,628	25,793,265,225	1.10	113,490,367	9%
2008	14,293,994	26,309,130,529	1.10	115,760,174	12%
2009	18,249,375	26,835,313,140	1.10	118,075,378	15%
2010	22,370,427	27,372,019,402	1.10	120,436,885	19%
2011	26,664,085	27,919,459,790	1.10	122,845,623	22%
2012	31,137,572	28,477,848,986	1.10	125,302,536	25%

Annual Funding of EPS Credit Purchase Program for Solar-Electric Projects
Arizona Public Service Co.



Solar Electric Incentive and Annual Solar Electric Capacity Installed
Arizona Public Service Co.



Appendix B: ***Proposed EPS CPP – Impact on Tucson Electric Power Co.***

Effects of Proposed EPS Credit Purchase Program (CPP) 2005 to 2012

LSE: Tucson Electric Power Co.

Results:

Total Funds Allocated to EPS (SBC and EPS Surcharge Estimates for 2005-2012):	$40,532,004
Solar Electric CPP	
Portion of "Solar Electric" Requirement met by EPS CPP in YR 2012:	40.8%
Total "Solar Electric" MWp Installed (2005-2012):	6.7
Total Capital Leveraged - Solar Electric Installations:	$21,869,433
Total EPS Funds Committed to Solar Electric CPP:	$8,878,976
Percentage of Total EPS Funds used by Solar Electric CPP:	21.9%
Jobs Created (direct & indirect) by 2012:	139
Solar Hot Water CPP	
Portion of "Other Renewables" Requirement met by EPS CPP in YR 2012:	25.6%
Total Capital Leveraged - Solar Hot Water Installations:	$2,959,659
Total Number of Systems Installed - Solar Hot Water:	2,125
Total EPS Funds Committed to Solar Hot Water CPP:	$2,959,659
Percentage of Total EPS Funds used by Solar Hot Water CPP:	7.3%
Total Capital Leveraged (PV & SHW):	$24,829,092

Variables:

Percent Increase in EPS Funds Collected per Year:	2.0%
Percentage of Total Funds Allocated to EPS Credit Purchase Program:	30.0%
Solar Electric CPP	
Initial Solar Electric Incentive Amount (per Wp):	$3.10
Annual Reduction in Solar Electric Incentive Amount:	$0.30
Average Solar Electric System - Installed Price ($/Wp) for 2005:	$6.00
Percentage of Incentive Funds Allocated to Solar Electric:	75%
Estimated Decrease in Installed System Price (per year):	4.0%
Solar Hot Water CPP	
Initial Solar Hot Water Incentive Amount per system:	$1,500.00
Annual Reduction in Solar Hot Water Incentive Amount:	2.0%
Average Solar Hot Water System - Installed Price for 2005:	$3,000.00
Estimated Decrease in Installed System Price (per year):	2.0%
Percentage of Incentive Funds Allocated to SHW:	25%
Kilowatt-hours per Solar Hot Water System (annual average - provided by AriSEIA)	2500
Other CPP Variables	
Consumer Education Program - Percent of EPS CPP Allocated (2005):	2.0%
Annual Decrease in Funding for Consumer Education Program:	5.0%
Other EPS Variables	
EPS Solar Electric Requirement (percentage of total requirement)	60.0%
Kilowatt-hours generated by 1 kWp of Installed PV capacity per year	1890
EPS Multiplier for CPP Systems (0.5 for customer sited + 0.5 for in-state + 0.075 for in-state content)	1.075
Jobs / 1,000 kWp Installed (Table V-2, CEWG Report, Page 43)	87.5
EPS "Other Renewables" Requirement (percentage of total requirement)	40.0%

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **Tucson Electric Power Co.**

Distribution of Funds - LSE Projects & EPS CPP

Year	Total Funds Collected for EPS Programs *	% of Total Funds Allocated to LSE's EPS Projects	Funds Allocated to LSE's EPS Projects	% of Total Funds Allocated to EPS CPP	Funds Allocated to EPS CPP
2002	$4,450,000				
2003	$4,539,000				
2004	$4,629,780				
2005	$4,722,376	70%	$3,305,662.92	30%	$1,416,713
2006	$4,816,823	70%	$3,371,776.18	30%	$1,445,047
2007	$4,913,160	70%	$3,439,211.70	30%	$1,473,948
2008	$5,011,423	70%	$3,507,995.94	30%	$1,503,427
2009	$5,111,651	70%	$3,578,155.85	30%	$1,533,495
2010	$5,213,884	70%	$3,649,718.97	30%	$1,564,165
2011	$5,318,162	70%	$3,722,713.35	30%	$1,595,449
2012	$5,424,525	70%	$3,797,167.62	30%	$1,627,358
Total:	**$40,532,004**		**$28,372,403**		**$12,159,601**

Year	EPS CPP - Administration (1%)	EPS CPP - Consumer Education	EPS CPP - Funds Available for Incentives	EPS CPP - Funds for Solar Hot Water Incentives	EPS CPP - Funds for Solar Electric Incentives
2005	$14,167	$28,334	$1,374,211	$343,553	$1,030,658
2006	$14,450	$27,456	$1,403,141	$350,785	$1,052,355
2007	$14,739	$26,531	$1,432,677	$358,169	$1,074,508
2008	$15,034	$25,558	$1,462,834	$365,709	$1,097,126
2009	$15,335	$24,536	$1,493,624	$373,406	$1,120,218
2010	$15,642	$23,462	$1,525,061	$381,265	$1,143,796
2011	$15,954	$22,336	$1,557,158	$389,289	$1,167,868
2012	$16,274	$21,156	$1,589,928	$397,482	$1,192,446
Total:	**$121,596**	**$199,370**	**$11,838,635**	**$2,959,659**	**$8,878,976**

* Baseline is 2002 (from Table A1-2, CEWG Report) and includes SBC and EPS Surcharge funds only; 2003 to 2012 are estimates and assume annual increase of 2% due to expansion of customer base.

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **Tucson Electric Power Co.**

Solar Electric Component of EPS CPP

Year	Solar Electric Incentive Amount ($/Wp)	Minimum Wp Funded	Average System Cost ($/Wp) **	Capital Leveraged	Cumm. Solar Electric Power Installed (Wp)	Solar Electric kWh Generated
2005	$3.10	443,294	$6.00	$1,285,553	443,294	837,826
2006	$2.80	501,122	$5.76	$1,483,320	944,416	1,784,945
2007	$2.50	573,071	$5.53	$1,736,176	1,517,487	2,868,050
2008	$2.20	664,925	$5.31	$2,066,863	2,182,411	4,124,757
2009	$1.90	786,118	$5.10	$2,512,496	2,968,529	5,610,521
2010	$1.60	953,163	$4.89	$3,138,038	3,921,693	7,411,999
2011	$1.30	1,197,814	$4.70	$4,068,430	5,119,506	9,675,867
2012	$1.00	1,589,928	$4.51	$5,578,557	6,709,435	12,680,831
Total:		**6,709,435**		**$21,869,433**		**44,994,796**
	MWp =	6.7			MWh =	44,995

Year	Solar Electric EPS Credits Generated	TEP Retail kWh ***	EPS %	"Solar Electric" Requirement (kWh)	Percentage of EPS Solar Electric Requirement Met by CPP	In-State Jobs (by year)
2002		8,012,417,966	0.40			
2003		8,172,666,325	0.60			
2004		8,336,119,652	0.80			
2005	1,738,488	8,502,842,045	1.00	51,017,052	3%	39
2006	3,703,762	8,672,898,886	1.05	54,639,263	7%	44
2007	5,951,203	8,846,356,863	1.10	58,385,955	10%	50
2008	8,558,871	9,023,284,001	1.10	59,553,674	14%	58
2009	11,641,830	9,203,749,681	1.10	60,744,748	19%	69
2010	15,379,898	9,387,824,674	1.10	61,959,643	25%	83
2011	20,077,424	9,575,581,168	1.10	63,198,836	32%	105
2012	26,312,725	9,767,092,791	1.10	64,462,812	41%	139

** System price for 2005 based on information provided by American Solar Electric for average grid-tied system price (non-battery); Price estimated to decline 4% per year after 2005

*** From Table II-1, Pg. 13, CEWG Report; 2003 to 2012 are estimates and assume annual increase of 2% due to expansion of customer base

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **Tucson Electric Power Co.**

Solar Hot Water Component of EPS CPP

Year	Solar Hot Water Incentive Amount ($/System)	Minimum No. of Systems Funded	Avg. System Cost ($/System)	Capital Leveraged	Cumm. Number of Solar Hot Water Systems	Solar Hot Water kWh Generated (equivalent)
2005	$1,500.00	229	$3,000.00	$343,553	229	572,588
2006	$1,470.00	239	$2,940.00	$350,785	468	1,169,161
2007	$1,440.60	249	$2,881.20	$358,169	716	1,790,724
2008	$1,411.79	259	$2,823.58	$365,709	975	2,438,322
2009	$1,383.55	270	$2,767.10	$373,406	1,245	3,113,046
2010	$1,355.88	281	$2,711.76	$381,265	1,526	3,816,030
2011	$1,328.76	293	$2,657.53	$389,289	1,819	4,548,458
2012	$1,302.19	305	$2,604.38	$397,482	2,125	5,311,562
Total:		**2,125**		**$2,959,659**		**22,759,893**
					MWh =	22,760

Year	Solar Hot Water EPS Credits Generated	TEP Retail kWh ***	EPS %	"Other Renewables" Requirement (kWh)	Percentage of EPS "Other Renewables" Requirement Met by CPP
2002		8,012,417,966	0.40		
2003		8,172,666,325	0.60		
2004		8,336,119,652	0.80		
2005	1,188,120	8,502,842,045	1.00	34,011,368	3%
2006	2,426,010	8,672,898,886	1.05	36,426,175	7%
2007	3,715,753	8,846,356,863	1.10	38,923,970	10%
2008	5,059,519	9,023,284,001	1.10	39,702,450	13%
2009	6,459,570	9,203,749,681	1.10	40,496,499	16%
2010	7,918,263	9,387,824,674	1.10	41,306,429	19%
2011	9,438,051	9,575,581,168	1.10	42,132,557	22%
2012	11,021,492	9,767,092,791	1.10	42,975,208	26%

Appendix C: ***Proposed EPS CPP – Impact on UniSource Energy Serv. Co.***

Effects of Proposed EPS Credit Purchase Program (CPP) 2005 to 2012

LSE: UniSource Energy Services Co.

Results:

Total Funds Allocated to EPS (SBC and EPS Surcharge Estimates for 2005-2012):	$4,932,182
Solar Electric CPP	
Portion of "Solar Electric" Requirement met by EPS CPP in YR 2012:	40.8%
Total "Solar Electric" MWp Installed (2005-2012):	0.8
Total Capital Leveraged - Solar Electric Installations:	$2,661,206
Total EPS Funds Committed to Solar Electric CPP:	$1,080,448
Percentage of Total EPS Funds used by Solar Electric CPP:	21.9%
Jobs Created (direct & indirect) by 2012:	17
Solar Hot Water CPP	
Portion of "Other Renewables" Requirement met by EPS CPP in YR 2012:	25.6%
Total Capital Leveraged - Solar Hot Water Installations:	$360,149
Total Number of Systems Installed - Solar Hot Water:	259
Total EPS Funds Committed to Solar Hot Water CPP:	$360,149
Percentage of Total EPS Funds used by Solar Hot Water CPP:	7.3%
Total Capital Leveraged (PV & SHW):	$3,021,356

Variables:

Percent Increase in EPS Funds Collected per Year:	2.0%
Percentage of Total Funds Allocated to EPS Credit Purchase Program:	30.0%
Solar Electric CPP	
Initial Solar Electric Incentive Amount (per Wp):	$3.10
Annual Reduction in Solar Electric Incentive Amount:	$0.30
Average Solar Electric System - Installed Price ($/Wp) for 2005:	$6.00
Percentage of Incentive Funds Allocated to Solar Electric:	75.0%
Estimated Decrease in Installed System Price (per year):	4.0%
Solar Hot Water CPP	
Initial Solar Hot Water Incentive Amount per system:	$1,500.00
Annual Reduction in Solar Hot Water Incentive Amount:	2.0%
Average Solar Hot Water System - Installed Price for 2005:	$3,000.00
Estimated Decrease in Installed System Price (per year):	2.0%
Percentage of Incentive Funds Allocated to SHW:	25.0%
Kilowatt-hours per Solar Hot Water System (annual average - provided by AriSEIA)	2500
Other CPP Variables	
Consumer Education Program - Percent of EPS CPP Allocated (2005):	2.0%
Annual Decrease in Funding for Consumer Education Program:	5.0%
Other EPS Variables	
EPS Solar Electric Requirement (percentage of total requirement)	60.0%
Kilowatt-hours generated by 1 kWp of Installed PV capacity per year	1890
EPS Multiplier for CPP Systems (0.5 for customer sited + 0.5 for in-state + 0.075 for in-state content)	1.075
Jobs / 1,000 kWp Installed (Table V-2, CEWG Report, Page 43)	87.5
EPS "Other Renewables" Requirement (percentage of total requirement)	40.0%

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **UniSource Energy Services Co.**

Distribution of Funds - LSE Projects & EPS CPP

Year	Total Funds Collected for EPS Programs *	% of Total Funds Allocated to LSE's EPS Projects	Funds Allocated to LSE's EPS Projects	% of Total Funds Allocated to EPS CPP	Funds Allocated to EPS CPP
2002	$541,503				
2003	$552,333				
2004	$563,380				
2005	$574,648	70%	$402,253.27	30%	$172,394
2006	$586,140	70%	$410,298.34	30%	$175,842
2007	$597,863	70%	$418,504.30	30%	$179,359
2008	$609,821	70%	$426,874.39	30%	$182,946
2009	$622,017	70%	$435,411.88	30%	$186,605
2010	$634,457	70%	$444,120.12	30%	$190,337
2011	$647,146	70%	$453,002.52	30%	$194,144
2012	$660,089	70%	$462,062.57	30%	$198,027
Total:	**$4,932,182**		**$3,452,527**		**$1,479,655**

Year	EPS CPP - Administration (1%)	EPS CPP - Consumer Education	EPS CPP - Funds Available for Incentives	EPS CPP - Funds for Solar Hot Water Incentives	EPS CPP - Funds for Solar Electric Incentives
2005	$1,724	$3,448	$167,222	$41,806	$125,417
2006	$1,758	$3,341	$170,743	$42,686	$128,057
2007	$1,794	$3,228	$174,337	$43,584	$130,753
2008	$1,829	$3,110	$178,007	$44,502	$133,505
2009	$1,866	$2,986	$181,753	$45,438	$136,315
2010	$1,903	$2,855	$185,579	$46,395	$139,184
2011	$1,941	$2,718	$189,484	$47,371	$142,113
2012	$1,980	$2,574	$193,472	$48,368	$145,104
Total:	**$14,797**	**$24,261**	**$1,440,598**	**$360,149**	**$1,080,448**

* Baseline estimate calculation for 2002 uses ratio of TEP funds collected to TEP retail kWh sold multiplied by estimate of USES kWh sold; 2003 to 2012 are estimates and assume annual increase of 2% due to expansion of customer base.

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **UniSource Energy Services Co.**

Solar Electric Component of EPS CPP

Year	Solar Electric Incentive Amount ($/Wp)	Minimum Wp Funded	Average System Cost ($/Wp) **	Capital Leveraged	Cumm. Solar Electric Power Installed (Wp)	Solar Electric kWh Generated
2005	$3.10	53,943	$6.00	$156,434	53,943	101,952
2006	$2.80	60,980	$5.76	$180,499	114,922	217,203
2007	$2.50	69,735	$5.53	$211,268	184,657	349,002
2008	$2.20	80,912	$5.31	$251,508	265,569	501,926
2009	$1.90	95,660	$5.10	$305,736	361,229	682,722
2010	$1.60	115,987	$4.89	$381,856	477,216	901,937
2011	$1.30	145,757	$4.70	$495,071	622,973	1,177,419
2012	$1.00	193,472	$4.51	$678,833	816,445	1,543,081
Total:		**816,445**		**$2,661,206**		**5,475,242**
	MWp =	0.8			MWh =	5,475

Year	Solar Electric EPS Credits Generated	USES Retail kWh ***	EPS %	"Solar Electric" Requirement (kWh)	Percentage of EPS Solar Electric Requirement Met by CPP	In-State Jobs (by year)
2002		975,000,000	0.40			
2003		994,500,000	0.60			
2004		1,014,390,000	0.80			
2005	211,550	1,034,677,800	1.00	6,208,067	3%	5
2006	450,696	1,055,371,356	1.05	6,648,840	7%	5
2007	724,179	1,076,478,783	1.10	7,104,760	10%	6
2008	1,041,496	1,098,008,359	1.10	7,246,855	14%	7
2009	1,416,649	1,119,968,526	1.10	7,391,792	19%	8
2010	1,871,520	1,142,367,896	1.10	7,539,628	25%	10
2011	2,443,144	1,165,215,254	1.10	7,690,421	32%	13
2012	3,201,893	1,188,519,559	1.10	7,844,229	41%	17

** System price for 2005 based on information provided by American Solar Electric for average grid-tied system price (non-battery); Price estimated to decline 4% per year after 2005

*** From Appendix 4, Pg. 69, CEWG Report; 2003 to 2012 are estimates and assume annual increase of 2% due to expansion of customer base

Effects of Proposed EPS Credit Purchase Program (CPP) - 2005 to 2012

LSE: **UniSource Energy Services Co.**

Solar Hot Water Component of EPS CPP

Year	Solar Hot Water Incentive Amount ($/System)	Minimum No. of Systems Funded	Avg. System Cost ($/System)	Capital Leveraged	Cumm. Number of Solar Hot Water Systems	Solar Hot Water kWh Generated (equivalent)
2005	$1,500.00	28	$3,000.00	$41,806	28	69,676
2006	$1,470.00	29	$2,940.00	$42,686	57	142,271
2007	$1,440.60	30	$2,881.20	$43,584	87	217,906
2008	$1,411.79	32	$2,823.58	$44,502	119	296,710
2009	$1,383.55	33	$2,767.10	$45,438	152	378,814
2010	$1,355.88	34	$2,711.76	$46,395	186	464,358
2011	$1,328.76	36	$2,657.53	$47,371	221	553,484
2012	$1,302.19	37	$2,604.38	$48,368	259	646,343
Total:		**259**		**$360,149**		**2,769,563**
					MWh =	2,770

Year	Solar Hot Water EPS Credits Generated	USES Retail kWh ***	EPS %	"Other Renewables" Requirement (kWh)	Percentage of EPS "Other Renewables" Requirement Met by CPP
2002		975,000,000	0.40		
2003		994,500,000	0.60		
2004		1,014,390,000	0.80		
2005	144,578	1,034,677,800	1.00	4,138,711	3%
2006	295,212	1,055,371,356	1.05	4,432,560	7%
2007	452,156	1,076,478,783	1.10	4,736,507	10%
2008	615,673	1,098,008,359	1.10	4,831,237	13%
2009	786,040	1,119,968,526	1.10	4,927,862	16%
2010	963,543	1,142,367,896	1.10	5,026,419	19%
2011	1,148,480	1,165,215,254	1.10	5,126,947	22%
2012	1,341,163	1,188,519,559	1.10	5,229,486	26%

Appendix D: ***On the Path to Mainstream Solar Power***

On the Path to Mainstream Solar Power

TOP 10 RECOMMENDATIONS TO ENABLE SUCCESS

The following recommendations are derived from the world's most successful programs designed to mainstream solar photovoltaic (PV) power for grid-connected markets. The recommendations are intended for policymakers, legislators, regulators, and fund managers. The Top 10 Recommendations are listed here in brief, followed by a more in-depth description.

1. **Include net metering and sufficient market-based financial incentives** to achieve the economic clearing price for direct consumer purchases (10 year simple payback for homes and 5 year simple payback for businesses)

2. **Provide market certainty for at least 5 years, and 10 years preferred,** to ensure industry scale up and investment

3. **Encourage a broad portfolio of applications**, from smaller homes (kW scale) to larger commercial and public facilities (MW scale)

4. **Promote open access and competition** so that rules provide a level playing field for all companies and promote innovation and price reduction

5. **Implement responsive and transparent administration** of the program to minimize transaction costs and provide all stakeholders access to regularly updated program status and data

6. **Include adequate oversight and standards requirements** of the industry to protect consumers and ratepayers' investments

7. **Conduct regular program reviews and make adjustments as needed**, and do so collaboratively with all major stakeholders in a working group fashion

8. **Implement important program details**, such as reservation and fund governance, paperwork requirements, and progress payments for large projects

9. **Define, and measure for, success** to maximize and communicate the benefits of the program

10. **Build on other successful solar power programs** when defining and implement rules, paperwork requirements, success metrics, oversight, and reporting

DESCRIPTION OF THE TOP 10 RECOMMENDATIONS TO ENABLE A SUCCESSFUL SOLAR POWER PROGRAM

1. **Include net metering and sufficient market-based financial incentives** to achieve the economic clearing price for direct consumer purchases (10 year simple payback for homes and 5 year simple payback for businesses). The program is market-based with end-user ownership and/or leasing of systems. Net metering and financial incentives are the fundamental building blocks needed to enable a robust and growing solar power market.
    a. **Net metering**
        i. Net metering of systems at least up to 1 MW in size is allowed.
        ii. No fees of any kind are assessed for net metering customers that are not otherwise assessed to other customers in the same rate class. Similar to other demand side management and energy efficiency applications, there are no standby fees, no exit fees, no engineering and application fees. Net metering for all rate schedules and tariff classes is allowed. Model net metering laws exist as excellent templates.
        iii. Includes easy access to the utility grid. Simple forms to fill out and fast turn-around for utility approval (<30 days).
    b. **Financial Incentives**
        i. Incentives are market-based, designed to accrue directly to the owner of the system (in most cases the end-user of the power generated).
        ii. The incentives are sized and packaged together to provide market clearing economics, a 10-year simple payback for residential customers and 5-year simple payback for commercial customers. Payback must consider solar resource availability (hence solar power production) and conventional grid-supplied electricity rates.
        iii. Jump-start the program with higher initial incentives. In other words, be conservative in the economics calculations to ensure the program gets off to a good start and to encourage the marketplace. Then implement steady declines in the amount of financial incentives over time.
        iv. Financial incentives decline over time to match the pace of installed system price reductions. A 5% per year reduction over time is a good rule of thumb. Declines should be implemented once the program has taken hold. The intent is to leverage public funding to the fullest extent while the price of the technology declines over time.
        v. ***There are a number of incentive approaches***, and a combination of one or more of these approaches can be used to provide adequate economic incentives for consumers to purchase solar power.
            1. Rebate incentives or "buydowns" are typically structured in the form of an upfront payment to lower the total installed cost of the system. Buydowns are paid on a $/W basis.
            2. Production incentives, paid on a $/kWh basis for every kWh produced, may be a stand alone alternative to buydowns or can be used in hybrid form to work with buydowns and other incentives.
            3. Tax credits, in the form of income tax credits, are typically based on a % of the total installed system cost.
            4. Tax exemptions can be very effective financial incentives that add significantly to the overall financial incentive package. Sales tax and property tax exemptions are the most predominant.
            5. Renewable Energy Credits (RECS), Renewable Certifications or TAGS are a legally tradable commodity, owned by the system owner.

6. Renewable Portfolio Standard (RPS). A solar "band" or "set-aside" specifying a percentage of the total RPS be met with solar power can be effective. The use of multipliers which credit the unique attributes of solar power generation can improve deployment.
7. Low interest loans (<3%) with favorable terms (>15 years) will greatly enable the market. They are essential for a production incentive based program.
8. Other incentives have proven to be effective elements to successful solar power programs, such as incentives for local manufacturing and economic development. However, in general, the more successful programs have structured a level playing field for all businesses to grow and compete on the same basis thereby not providing a special incentive or dispensation to any single company.

2. **Provide market certainty for at least 5 years, and 10 years preferred,** to ensure industry scale up and investment.
    a. Put in place a platform that is stable and long-term. The longer the program horizon and the higher the certainty level, the more industry will invest in the region to build infrastructure, scale up, and serve the market. The success of the program, including job creation, power and energy production, and pollution avoided are all contingent on the depth and length of program funding and certainty. A consistent long-term program will enable the industry to develop over time, increase competition, and ultimately create price reductions and deliver on the key program success metrics.

    b. Some flexibility is important to fine tune the program as needed according to prevailing market conditions. It is difficult to predict pricing, supply, demand, and funding requirements versus time. Allowing program administrators to make fine-tuning adjustments can really improve program performance

    c. A degree of patience is required. It takes some time for these programs to build, for companies to respond to build infrastructure, to market, for consumers to respond and for adequate training programs to be implemented. It appears that at least 3 years are required for the programs to "hit stride".

    d. Eliminate program "stop and starts". Investment in any industry requires consistency. Fluctuations in funding from year to year and stoppages in the program can seriously undermine program momentum. Provisions to provide program consistency, such as escrow accounts to provide bridge funding, are recommended.

3. **Encourage a broad portfolio of applications**, including new and existing homes (kW scale) to larger commercial and public facilities (MW scale).

    a. Allow all ratepayers the opportunity to participate. This can be accomplished by creating a reserve of funding, such as 50% for smaller systems below 30 kW in size, and the remaining for systems greater than 30 kW.

    b. The systems are intended to offset a portion or all of the end-user's demand, and as such the systems can be mounted on rooftops or adjacent to facilities, such as in parking areas, connected on the end-user's side of the meter.

4. **Promote open access and competition** so that rules provide a level playing field for all companies and promote innovation and price reduction. Special economic incentives for companies to locate new local manufacturing facilities are not encouraged as they discourage competition.

5. **Implement responsive and transparent administration** of the program to minimize transaction costs and provide all stakeholders access to regularly updated program status and data

    a. Allocate 2% of program funds for administering and evaluating the program, and for assuring consumer and ratepayer protection.

    b. Access to program progress must be afforded to all participants and stakeholders, including funding status, results of the program, and measurements against success criteria. A web interface updated monthly should be the standard.

    c. Implement standardized paperwork requirements that ensure consumer and ratepayer protection, yet minimize transaction costs.

    d. Minimize paperwork and payment turnaround times. For example, reservation requests are confirmed within 2 weeks of reservation submittal and payments are made within 3 weeks of final claim submittal.

6. **Include adequate oversight and standards requirements** of the industry to protect consumers and ratepayers' investments.

    a. Ensure high standards while maximizing competition by mandating certification of equipment and contractors.

    b. Systematic audits and spot checks of systems are encouraged to ensure systems have been installed and are operating properly and that the paperwork matches with reality in the field, including specified equipment.

    c. Performance meters should be required for all systems to measure energy (kWh) and power (kW) generated so that end-users can verify performance.

7. **Conduct regular program reviews and make adjustments as needed**, and do so collaboratively with all major stakeholders in a working group fashion.

    a. Formation of a stakeholder working group is encouraged to ensure an ongoing dialogue between industry and the fund managers. The program must work from both perspectives to be successful and sustaining.

    b. Quarterly meetings are encouraged to review lessons learned, discuss areas for improvement, and to reach consensus on changes and adjustments as needed to continuously improve the program.

8. **Implement other important program details heretofore not mentioned**, such as reservation and fund governance, paperwork requirements, and progress payments for large projects

    a. Require confirmation of a system purchase within 60 days to maintain approved reservation status. No extensions. After this time, return the "reserved" funds to the overall incentive account to allow the maximum number of customers to participate in the program. The money dedicated to the program should not be tied up on customers without a true interest in participating and this money should be kept within the program.

    b. Provide progress payments for larger systems (> 30 kW) on a schedule to completion basis. This alleviates financial strain for both the industry and system owners. Progress payments of up to 75% of the total incentive (in the case of rebates/buydowns) should be made when the solar power panels are physically installed at the job site and the remainder of the rebate should be paid upon project completion. These terms are commensurate with construction industry

practices and match the payment terms in the installation contract between the end-user and the system owner.

c. Do not use percentage caps to set the maximum incentive level. Some programs have caps, such as 50% of the total installed system price, to determine the maximum incentive level. Experience has shown this can lead to artificial price inflation.

d. All equipment must be new and approved to be on an eligibility list. Used equipment is not eligible.

e. Systems should be sized to meet on-site demand, and sized no larger than to meet twice historical or projected demand.

f. Systems must be permanently interconnected to the electrical system of the utility serving the end-user's electrical load. The system interconnection must comply with applicable electrical codes and utility interconnection requirements.

g. Properly trained and licensed contractors only are eligible to install systems.

h. All systems must have a minimum five-year warranty to protect the purchaser against system or component breakdown. The warranty must cover and provide for no-cost repair or replacement of the system or any defective components, including any associated labor for five years. The warranty must also cover the major components of the generating system against breakdown or degradation in electrical output of more than ten percent from their originally rated electrical output during the five year period.

i. Place funds into an escrow account when a reservation is confirmed. In this way the fiscal year budget source and amount will be unambiguous and the budget's integrity will be maintained.

j. Any unused incentive funds should be automatically "rolled-over" into the following year's budget. This rollover removes any ambiguity about the use of these funds and proscribes attempts to redirect these funds to other projects.

k. Customers may claim certain mounting surface costs as eligible project costs. Costs may include mounting surfaces for the solar panel and/or the materials that provide the primary support for the panels. Only the percentage of mounting surface directly under the solar panel is eligible. Roof membranes, roof decking or other materials used only to provide a weather or fire barrier to the building are ineligible. The applicant will need to provide documentation to justify all eligible costs claimed and all final eligible costs are subject to program administrator's approval.

l. Other ineligible costs include items that are not typically required for a given eligible system installation. These ineligible costs include, but are not limited to, tree trimming, re-roofing, roof repairs or roof reinforcement and landscaping.

9. **Define, and measure for, success** to maximize and communicate the benefits of the program.

a. Every public program is judged on its perceived success according to stakeholder expectations. Therefore it makes sense to first determine how stakeholders define success, and then develop quantitative and qualitative success measures.

b. Identify stakeholders before examining how success is defined. For solar incentive programs the primary stakeholders can be broadly categorized as:
    i. Program creators – legislators or other elected officials
    ii. Program implementers – the staff at city, state or utility departments charged with running the program

iii. Incentive recipients – those installing solar in accordance with program guidelines
iv. Environmental and solar advocacy non-profits – groups that supported the development of solar incentives
v. The public at large – individuals in the service area of the incentive program ranging from avid supporters to those against the existence of the program
vi. Private sector providers – companies that actually install the solar and depend on incentives for a portion of their revenue.

c. "How do you know if your program is successful?" While all stakeholders are likely to agree on the most basic levels of how the solar program success is defined, it has been our experience that there are often certain measures that are of critical importance to one set of stakeholders that are of no importance to others. Therefore, it is usually best to gain input from a representative sample of all of the various types of stakeholders and ask them how they will know if the program is successful.

There is also a variety of information available on program evaluation as well as measuring success. One source that provides a broad overview is the Baldrige National Quality Program's "Criteria for Performance Excellence," particularly the section on measurement, analysis and knowledge management. (see page 19, www.quality.nist.gov/PDF_files/2003_Business_Criteria.pdf). Consultants with specialized experience in public program evaluation can provide more tailored assistance as well.

d. Preliminary list of success criteria:
i. Program is directly contributing to a significant increase in reasonably-priced high-quality solar installations
ii. A variety of customers and a variety of solar providers are participating in the program
iii. All stakeholders have a clear understanding of what they have received for the funds expended on the program and they are pleased with the results
iv. Customers and solar providers are satisfied with the Program process and feel that it is efficient and effective

e. Preliminary list of performance measures:
i. Amount of solar installed (MW) and generation (MWh)
ii. Emissions avoided (CO_2, NO_x, SO_2)
iii. Tax revenue generated
iv. Number of customers using program
v. Direct and indirect jobs created
vi. Number of participating companies
vii. Delivered system pricing for different size categories
viii. Customer satisfaction and complaint tracking
ix. System audit results
x. Average system size (average kW per system)
xi. Amount of incentives disbursed to customers
xii. Amount of funds used for program administration
xiii. Amount of incentive reserved for systems currently under construction (signed contract between customer and solar provider)
xiv. Ratio of systems reserved to systems built (backlog)
xv. Length of time between reservation submittal and confirmation received
xvi. Length of time between confirmation and received and installation completed

xvii. Length of time between when a system is completed and when the Program remits incentive payment

f. Data collection**.** It is important that Program implementers define standard data records that enable performance measures to be calculated. In other words, relevant information about each customer of the program and each solar installation they consider, construct and complete needs to be collected in a standardized way, most likely using database software.

Once the information is collected, it should be analyzed and disbursed along with a certain level of commentary that seeks to provide the Program implementer's perspective on how the program is performing. This information should be provided on a regular periodic basis. Additionally, any revisions to historic measures should also be communicated at the same time with adequate documentation made available so that all stakeholders have an understanding of why changes are occurring and how that changes the historical analysis.

10. **Build on other successful solar power programs** when defining and implementing rules, paperwork requirements, success metrics, oversight, and reporting

a. The ideal would be a solar program that had the same basic elements across the country, albeit with different incentive levels to account for differences in the solar resource and electric rates. This would provide a common platform for industry growth, would minimize transaction costs and complexity, and result in the most efficient approach to the market with concomitant price reductions and innovation.

Since there is no national solar power program overlay, it is encouraged that one be built ad hoc to the fullest extent possible, where the best elements of existing programs are incorporated into new ones providing as much uniformity across program design as possible.

b. There is no need to reinvent the wheel and build from scratch. Successful solar power programs have been designed and implemented, yielding a compilation of excellent resources, templates, regulatory and legislative statutes that can be used in designing a new solar power program or to improve an existing one.

These templates, rules and regulations address all features of the Top 10 recommendations, including financial incentives, net metering, and program administration, oversight, monitoring and reporting.

For more information regarding solar power programs design, please contact:
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